ORIGINAL ARTICLE

Promoting excellent work ability and preventing poor work ability: the same determinants? Results from the Swedish HAKuL study

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Aim: Health has been described as a continuum between the two poles of excellent health and ill health. Research has so far focused on the negative pole, leaving knowledge about the positive pole vague. With a main focus on working life, the authors aim was to identify determinants promoting excellent work ability and determinants preventing poor work ability.

Methods: 5638 (73% answering rate) employees in the public sector in Sweden answered a questionnaire both at baseline and at follow up 18 months later. The employees were divided into three groups based on sick leave at follow up: excellent work ability (13%), poor work ability (15%), and a middle group (72%). Self reported sociodemographic data, lifestyle data, and working life exposures at baseline were fitted into logistic regression models to determine which factors, if any, promoted excellent work ability or protected against poor work ability.

Results: Some determinants were mutual, but more than half of the determinants in the final model were associated solely with promoting excellent work ability or preventing poor work ability, thus creating different patterns of associations. Promotion of excellent work ability seemed more dependent on physical factors, clear work tasks, and positive feedback, while prevention of poor work ability seemed more dependent on job security and psychosocial factors.

Conclusions: This explorative longitudinal study showed slightly different patterns of determinants promoting excellent work ability and preventing poor work ability. As most of the identified determinants are amenable to influence, our results open up the possibility of interventions for promoting excellent work ability and preventing poor work ability.

Health has been described as a continuum between the two poles of excellent health and ill health along which people move upwards and downwards.[1] Epidemiological research has so far focused almost exclusively on the negative pole, trying to describe associations between suspected harmful factors from different contexts and morbidity/mortality. The context may be individual, social, lifestyle, or working life. A different approach was suggested 10 years ago by Mackenbach *et al* who, in a cross sectional study,[2] explored the determinants of excellent health and those of ill health. Studying sociodemographic and lifestyle factors, they found largely similar patterns of association with excellent health as with ill health. They concluded that the processes by which excellent health is generated probably have much in common with those that generate ill health, but also that our understanding of the determinants of ill health is better than that of the determinants of excellent health. They recommended further study of the latter.

Aspects of working life and personal life associated with ill health and absence due to sickness have been the subject of numerous epidemiological studies.[3–15] Some studies, typically studies of risk,[13 15–19] have in part also identified health promotive determinants. However, knowledge about the positive end of the health continuum is still vague, raising several questions. Will longitudinal studies find the same determinants acting positively on both ends of the health continuum? That is, will the same determinants promote excellent health and prevent ill health? If so, will the promotion of excellent health and prevention of ill health come about at the same level of exposure? Are there factors that act only at one end of the continuum?

With a slightly modified, more work related approach we have tried to continue where Mackenbach's study ends. Thus, the aim of this study was to identify determinants promoting excellent work ability and determinants preventing poor work ability.

METHOD

Study instrument

The present study is a part of the longitudinal study ''Work and health in the public sector in Sweden'', the HAKuL study,[20] which was launched in 1999–2000 in four county councils and in the local authorities of six municipalities. The participating organisations were in the southern, middle, and northern parts of Sweden. The main occupational groups were registered nurses, assistant nurses, home based personal care workers in elderly care, employees at childcare centres, and teachers. The study started with a baseline postal questionnaire on individual factors, social situation, health, lifestyle, and work factors given to all 9003 employees in the participating organisations who were not long term sick listed for three months or longer at the time of the baseline questionnaire. A follow up questionnaire was mailed 18 months after baseline. The two questionnaires were followed by up to three reminders to the non-respondents.

Sample

Of initially 9003 individuals a total of 7735 were gainfully employed at the participating organisations both at baseline and follow up and consequently eligible to be included in this study. The baseline questionnaire was answered by 6710 of these 7735, and 5638 individuals also answered the follow up and were included in the present study. Thus the final sample

Table 1 Potential explanatory variables and their response alternatives categorised into a reference category and categories of exposure levels assumed to support good health

Determinants	Exposure	Reference
Sociodemographic domain		
Level of education	More than 11 years of schooling	At most 11 years of schooling
Good personal finances	Neither good nor bad Very good/good	Strained/very strained
Household with another adult and children	Living with another adult and child/children	Living alone with/without child/children or living with another adult without child/children
In charge of domestic responsibilities	Sharing equal Somebody else	Myself
Lifestyle domain		
Smoking	Non-smoker	Smoker
Obesity	BMI 25–29.9 BMI <25	BMI ⩾30
Leisure exercise	Once a week Twice or more per week	Occasionally
Recuperated and full of energy (index of 4 items, score 4–20)	Sometimes recuperated, 12–15 Mostly recuperated, >15	Seldom recuperated, <12
Working life domain		
Physically non-strenuous work (Borg's RPE scale 6–20)	Somewhat strenuous, 13–15 Non-strenuous, <13	Strenuous, >15
Heavy (>10 kg) lifting	1–5 times per day Almost never	>5 times per day
Forward bent work posture	Total of 1–60 min daily Almost never	Total of >60 min daily
Job security	Unchanged Increased	Decreased
Content with number of working hours	Content Would like to work more	Would like to work less
Mixed sexes at the workplace	A mix of women and men	Almost only women or men
In the mood for work	A couple of days per month of feeling uneasy on the way to work Never/seldom feeling uneasy on the way to work	Once a week/a couple of days of per week/daily feeling uneasy on the way to work
Mastery (index of six questions, score 6–30)	Moderate perception of mastery, 21–25 High perception of mastery, >25	Low perception of mastery, <21
Role clarity (index of 3 questions, score 3–15)	Moderate clarity, 12–14 High clarity, 15	Low clarity, <12
Psychological demands at work (index of 5 questions, score 5–20)	Moderate demands, 12–14 Low demands, <12	High demands, >14
Decision latitude (index of 6 questions, score 6–24)	Moderate decision latitude, 17–19 High decision latitude, >19	Low decision latitude, <17
Performance at work appreciated by superior	To some extent To a great extent	To a rather small extent/not at all

The three control variables of sex, age, and earlier sick leave are described in table 2.

represented 73% of the initially asked and consisted of 4728 women (84%) with a mean age of 46.5 years (range 20–66 years), and 910 men (16%), mean age 47.5 years (range 21–64 years).

Outcome measures

For studies of the working population, absence due to sickness has been suggested as a good proxy for health and that absence due to sickness should be seen in the context of social and physical functioning and perceived wellbeing.[21] That is, if healthy functioning for people in stable jobs is, by definition, attendance at work, then absence from work indicates some lack in healthy functioning—whether the causes are psychological, social, or physical. Absence due to sickness has also been explained as a coping strategy that reflects an individual's perception of his/her health and depends on a number of factors at different levels, primarily a combination of job demands and coping possibilities at work.[22] This view is similar to the two dimensions of the illness flexibility model—namely adjustment latitude and attendance requirements at work. These two dimensions determine the possibilities of going to work or not during illness.[23] Together these aspects can, with some simplification, be conceptualised into the term ''work ability'', which with its natural, flexible qualities is better suited to describe a gradual movement along the health continuum than the dichotomisation of healthy/sick.

Not being able to fulfil the demands of a job, because of ill health or other malfunctioning, and having to take sick leave as a result, could then be called reduced work ability. Such reduced work ability is the dominating legitimate reason for sickness absence with benefits in Sweden. Accordingly, the work ability status, defined in terms of self reported sick leave and days attended while sick during the last 12 months, was chosen as our outcome measure. According to data collected at follow up, the study group was divided into three subgroups: excellent work ability group, poor work ability group, and a middle group. Thus, *excellent work ability* was defined as lack of both sick leave and attendance with sickness during the 12 months before follow up. Excellent work ability was found to be true for 13% (n = 751) of the respondents. *Poor work ability* was defined as having had more than 28 days sick leave over the 12 months before follow up. Poor work ability was found to be true of 15% (n = 857). The remaining 72% (n = 4030) who had been on sick leave on 1–28 days and/or had attended work despite being sick at least once was used as comparison group.

Potential determinants of excellent work ability/poor work ability

As presumptive determinants of the outcomes excellent work ability and poor work ability, we chose exposure assessments at baseline that represented the three domains of interest: sociodemography (education, personal finances, domestic situation); lifestyle (smoking, body mass index (BMI), leisure exercise, recuperation); and working life (physical, psychosocial, and organisational work conditional factors) (table 1). These items consisted of questions and scales tested and used in previous occupational research.[24–32] Our aim was to identify positive determinants of work ability at both ends of the health continuum. However, because lack of empirical evidence about which, if any, exposure level of the chosen potential determinants supports work ability, the answer categories were, in most cases, trichotomised. Cut offs were set according to our expectations and clinical experience of what would be highly supportive of, somewhat supportive of, or hazardous to an individual's work ability. The last category was used as reference.

Non-respondents and dropouts

The 1025 non-respondents at baseline and 1072 dropouts at follow up were respectively two and three years younger on average and included a somewhat higher proportion of men compared with the proportion of men among the participants. The dropouts reported somewhat worse health and somewhat more sick leave at baseline compared with the participants.

Statistical analyses

In order to determine if sociodemographic, lifestyle, and working life exposure variables acted as determinants promoting excellent work ability, preventing poor work ability, or achieving both, logistic regression models were fitted in three steps and separately for the two outcomes. For the analyses of excellent work ability the 15% reporting poor work ability were omitted, and for the analyses of poor work ability the 13% reporting excellent work ability were omitted. The middle group was in both cases used as comparison group. Separate analyses were carried out for women, men, and all respondents together. In all steps of the analyses we controlled for age and earlier sick leave, and in analyses of all respondents together also for sex. As the results for women and men throughout the analyses were almost identical we will show only the combined results.

In the first step all exposure variables were individually examined. The results of this step are not shown, but all variables that were associated with either of the two outcome variables were included in step 2. Association was defined as having a point estimate with a 95% confidence interval (CI) that did not include 1; or a positive point estimate of $\geqslant 1.2$ with the lower limit of the 95% CI $\geqslant 0.95$; or a negative point estimate of $\leqslant 0.83$ with the higher limit of the 95% CI $\leqslant 1.05$.

In the second step four separate models were used to conduct the multivariate analyses (tables 3 and 4)—one for the control variables (sex, age, and earlier sick leave), and one for each of the three domains. Thus identical models were used to analyse associations with the two outcome variables—excellent and poor work ability. All exposure variables that, on the same grounds as between step 1 and 2, associated with the dependent variables were chosen for a third step, a full model (table 5). The statistical analyses were carried out using SAS, release 8.02, procedure PROC LOGISTIC.

Table 2 Demographic characteristics of the three studied groups

Characteristics (all, n = 5638)	Excellent work ability n = 751	"Middle" work ability (comparison group) n = 4030	Poor work ability n = 857
Sex*			
Women (n = 4728; 84%)	78%†	84%	91%†
Men (n = 910; 16%)	22%†	17%	9%†
Age*			
20–44 years (n = 2112; 38%)	30%	40%	32%
45–54 years (n = 2251; 40%)	41%	39%	43%
55–66 years (n = 1275; 23%)	29%	21%	25%
Mean age (years)	48.5‡	46	47.5
Sick leave the year before baseline*			
0 days (n = 2038; 36%)	67%†	34%	20%†
1–28 days (n = 2945; 53%)	29%†	57%	52%†
>28 days (n = 615; 11%)	4%†	9%	28%†
Born in Sweden (n = 384; 7%)	94%	93%	94%
Education			
>11 years of school (n = 3492; 63%)	64%†	64%	58%†
10 largest professions			
Managers (n = 209; 4%)	7%†	3%	3%†
Medical doctors (n = 195; 4%)	4%	4%	2%
Primary school teachers (n = 432; 8%)	8%†	8%	4%†
Nurses (n = 692; 12%)	14%	12%	14%
Psychologists/social workers (n = 182; 3%)	3%	3%	3%
Pre-primary school teachers (n = 392; 7%)	6%	8%	5%
Childcare workers (n = 258; 5%)	3%	5%	4%
Assistant nurses (n = 747; 13%)	12%†	13%	16%†
Home based personal care workers (n = 588; 10%)	10%†	9%	15%†
Attendants in psychiatric care (n = 413; 7%)	5%†	8%	9%†
Sector of employment			
Municipalities (n = 3689; 65%)	65%	66%	64%
County councils (n = 1949; 35%)	35%	34%	36%

*Control variable.
†Statistically significant test of 95% confidence interval for the difference between the proportions of the excellent and poor work ability groups.
‡Statistically significant test of 95% confidence interval for the difference between the mean values of the excellent and poor work ability groups.

Table 3 Control variables used in the regression models in tables 4–5 and their associations with excellent and poor work ability, respectively

	Excellent work ability (n = 751)			Poor work ability (n = 857)		
Determinant	Exposed cases (n)	OR	95% CI	Exposed cases (n)	OR	95% CI
Sex						
Women	584	1		780	1	
Men	167	1.27	1.04 to 1.55	77	0.55	0.43 to 0.71
Age (years)						
⩾55	219	1		215	1	
45–54	310	0.76	0.62 to 0.93	371	0.99	0.82 to 1.21
⩽44	222	0.58	0.47 to 0.72	271	0.71	0.58 to 0.87
Earlier sick leave						
>28 days	29	1		233	1	
1–28 days	217	1.22	0.81 to 1.82	442	0.31	0.26 to 0.38
0 days	500	4.47	3.02 to 6.64	169	0.20	0.16 to 0.25

Multivariate logistic regression adjusted for all three variables expressed as odds ratios (OR) and their 95% confidence intervals (CI).

RESULTS

Demographic features of the studied groups are displayed in table 2. Test of 95% confidence interval for the difference between the proportions of demographic features of the excellent and of the poor work ability groups showed no statistically significant difference in sector of employment or in age groups, but the mean age was somewhat higher and a greater proportion of men and a smaller proportion of women belonged to the excellent group. Only 33% of the excellent work ability group had been on sick leave during the year preceding the baseline compared with 80% in the poor work ability group. There were some differences in level of education and consequently in occupation. Of the 10 largest professions in the studied population, there was a significantly larger representation of managers and primary school teachers in the excellent work ability group, and in the group with poor work ability a significantly larger representation of assistant nurses, home based personal care workers, and attendants within psychiatric care.

Multivariate analyses

Our report on the outcomes of the multivariate analyses—excellent and poor work ability—is focused mainly on the domain specific results. Associations between the exposure variables and excellent or poor work ability are presented as odds ratios.

The associations between the three control variables of sex, age, and earlier sick leave and the two outcome variables were also analysed separately (table 3). Compared with women, men had a higher probability of excellent work ability and a lower probability of poor work ability. There was an increased probability of excellent work ability for the oldest age group (⩾55 years), but a decreased probability of poor work ability only for the youngest age group (20–44 years). Not having had any days of sick leave during the year before baseline was associated with excellent work ability, OR 4.47 (95% CI 3.02 to 6.64), as well as with poor work ability, OR 0.20 (95% CI 0.16 to 0.25). There was also a lower probability of poor work ability in the group that had had up to 28 days of sick leave, OR 0.31 (95% CI 0.26 to 0.38). These associations remained with no substantial change in the domain specific and full models.

Domain specific results

Sociodemographic domain

A determinant for both excellent and poor work ability was the status of personal finances, independent of exposure level. No other sociodemographic factor was associated with either of the outcomes (see table 4).

Lifestyle domain

Leisure exercise, even just once a week, and mostly feeling recuperated when starting work and full of energy throughout the working day were associated with excellent work ability. To decrease the probability of poor work ability it was enough simply to sometimes be recuperated. Not smoking and not being obese were also associated with a decreased probability of poor work ability (see table 4).

Working life domain

Only two factors in the working life domain were associated with both excellent and poor work ability: being content with the number of working hours, and having low psychological demands at work (see table 4).

Most of the identified determinants were associated solely with promoting excellent work ability or preventing poor work ability. Wanting to work more hours than contracted, physically non-strenuous jobs, favourable work postures, having clarity of goals, expectations, and responsibilities, and work performance being appreciated by superiors were factors associated with a higher probability of excellent work ability. Factors associated solely with decreased probability of poor work ability were being spared heavy lifting at work, experiencing the job as rather secure (no planned cut backs or enlargements), mostly being in a good mood when going to work, perceiving high mastery at work (the perception of having produced a successful outcome), and experiencing at least moderate decision latitude or control.

Full models

In the full models, domain specific associations remained largely unchanged. The associations between excellent work ability and recuperation as well as physically strenuous work were diluted, as were the associations between poor work ability and heavy lifting and job security. A U-shaped relation between being in the mood for work and excellent work ability became distinct in the full model (see table 5).

DISCUSSION

In this exploratory analysis we tried to find out if the same determinants act in a positive direction at both ends of a health continuum. We found some mutual determinants for the two outcomes, but more than half of the determinants in the full model were associated solely with either promoting excellent work ability or preventing poor work ability, thus creating different patterns of associations at the two endpoints.

Besides the mutual determinants sex, age, personal finances, earlier sick leave, and psychological demands at

Table 4 Domain specific multivariate logistic regression models for the domains sociodemography, lifestyle, and working life showing baseline determinants for excellent and poor work ability, respectively, expressed as odds ratios (OR) and their 95% confidence intervals (CI)

	Excellent work ability (n = 751)			Poor work ability (n = 857)		
Determinant	**Exposed cases (n)**	**OR**	**95% CI**	**Exposed cases (n)**	**OR**	**95% CI**
Sociodemography						
Education						
⩽11 years of schooling	268	1		358	1	
>11 years of schooling	466	0.95	0.80 to 1.14	489	0.86	0.73 to 1.01
Personal finances						
Strained	75	1		202	1	
Neither good nor bad	285	1.30	0.98 to 1.73	363	0.66	0.54 to 0.82
Good	389	1.67	1.26 to 2.21	286	0.55	0.44 to 0.69
Household						
Various household combination	435	1	1	508	1	
Living with another adult and children	310	0.87	0.73 to 1.05	346	0.87	0.73 to 1.03
Lifestyle						
Smoker	167	1		266	1	
Non-smoker	573	1.11	0.90 to 1.35	573	0.78	0.66 to 0.94
BMI						
⩾30	53	1		141	1	
25–29.9	259	1.24	0.89 to 1.74	284	0.62	0.48 to 0.80
<25	420	1.17	0.85 to 1.62	409	0.55	0.43 to 0.70
Leisure exercise						
Occasionally	87	1		166	1	
Once per week	160	1.29	0.96 to 1.75	167	0.93	0.72 to 1.21
⩾Twice per week	484	1.28	0.98 to 1.66	504	0.95	0.76 to 1.18
Recuperation						
Seldom recuperated	30	1		127	1	
Sometimes recuperated	122	0.91	0.58 to 1.42	305	0.65	0.49 to 0.84
Mostly recuperated	581	1.96	1.30 to 2.96	387	0.47	0.36 to 0.61
Working life						
Physically strenuous work						
Strenuous (16−)	65	1		181	1	
Somewhat strenuous (13–15)	346	1.33	0.97 to 1.82	418	0.96	0.76 to 1.22
Non-strenuous (–12)	331	1.37	0.97 to 1.93	245	0.89	0.67 to 1.19
Heavy lifting						
⩾6 times per day	129	1		219	1	
1–5 times per day	195	0.99	0.75 to 1.30	252	0.94	0.75 to 1.19
Almost never	421	0.92	0.69 to 1.22	376	0.81	0.63 to 1.04
Bent work posture						
>60 min per day	118	1		229	1	
1–60 min per day	312	1.13	0.87 to 1.46	395	0.96	0.78 to 1.19
Almost never	315	1.64	1.25 to 2.17	223	1.01	0.78 to 1.31
Job security						
Decreased	43	1		92	1	
Unchanged	640	1.01	0.70 to 1.45	684	0.76	0.57 to 1.01
Increased	47	1.21	0.74 to 1.97	61	1.01	0.67 to 1.52
Number of working hours						
Would like to work fewer	146	1		308	1	
Content with the number	546	1.66	1.33 to 2.07	457	0.78	0.65 to 0.94
Would like to work more	54	1.63	1.11 to 2.40	78	1.18	0.86 to 1.63
In the mood for work						
Often feeling uneasy on the way to work	26	1		114	1	
Sometimes feeling uneasy	78	0.65	0.39 to 1.08	244	0.62	0.46 to 0.84
Seldom feeling uneasy	642	1.22	0.77 to 1.94	492	0.50	0.37 to 0.67
Mastery						
Low perception	109	1		211	1	
Moderate perception	439	0.92	0.70 to 1.20	476	1.07	0.86 to 1.33
High perception	189	1.04	0.75 to 1.44	150	1.35	1.00 to 1.81
Role clarity						
Low	131	1		214	1	
Moderate	399	1.03	0.81 to 1.31	452	0.96	0.77 to 1.18
High	200	1.28	0.96 to 1.71	171	0.93	0.71 to 1.22
Demands						
High	167	1		331	1	
Moderate	276	1.14	0.90 to 1.44	318	0.89	0.73 to 1.08
Low	296	1.32	1.04 to 1.69	191	0.73	0.58 to 0.93
Control						
Low decision latitude	199	1		332	1	
Moderate decision latitude	300	1.10	0.88 to 1.37	319	0.83	0.69 to 1.01
High decision latitude	237	0.93	0.73 to 1.19	188	0.73	0.58 to 0.92
Performance appreciated by superior						
To a rather small extent	140	1		273	1	
To some extent	304	1.36	1.07 to 1.72	333	0.97	0.79 to 1.19
To a great extent	291	1.55	1.20 to 2.00	221	1.06	0.83 to 1.34

The odds ratios are, in addition to the control variables sex, age, and earlier sick leave, adjusted for all determinants in respective domain.

Table 5 Full multivariate logistic regression models showing baseline determinants for excellent and poor work ability, respectively, expressed as odds ratios (OR) and their 95% confidence intervals (CI)

	Excellent work ability (n = 751)			Poor work ability (n = 857)		
Determinant	**Exposed cases (%)**	**OR**	**95% CI**	**Exposed cases (%)**	**OR**	**95% CI**
Sex						
Women	584	1		780	1	
Men	167	1.37	1.09–1.73	77	0.52	0.39–0.70
Age (years)						
⩾55	219	1		215	1	
45–54	310	0.92	0.73 to 1.17	371	0.89	0.71 to 1.12
⩽44	222	0.69	0.54 to 0.89	271	0.63	0.50 to 0.81
Earlier sick leave						
>28 days	29	1		233	1	
1–28 days	217	1.29	0.78 to 2.12	442	0.36	0.28 to 0.45
0 days	500	4.29	2.63 to 7.01	169	0.26	0.20 to 0.33
Personal finances						
Strained	75	1		202	1	
Neither good nor bad	285	1.20	0.87 to 1.65	363	0.72	0.57 to 0.91
Good	389	1.33	0.96 to 1.83	286	0.65	0.51 to 0.84
Smoking						
Smoker	167	1		266	1	
Non-smoker	573	1.12	0.89 to 1.39	573	0.84	0.69–1.02
BMI						
⩾30	53	1		141	1	
25–29.9	259	1.17	0.82 to 1.67	284	0.62	0.47 to 0.80
<25	420	1.14	0.80 to 1.60	409	0.65	0.49 to 0.86
Leisure exercise						
Occasionally	87	1		166	1	
Once per week	160	1.28	0.93 to 1.77	167	0.95	0.72 to 1.26
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Recuperation						
Seldom recuperated	30	1		127	1	
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Almost never	421	0.90	0.67 to 1.22	376	0.85	0.65–1.11
Bent work posture						
>60 min per day	118	1		229	1	
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Almost never	315	1.61	1.21 to 2.16	223	0.99	0.75 to 1.30
Job security						
decreased	43	1		92	1	
Unchanged	640	0.98	0.66 to 1.44	684	0.87	0.64 to 1.17
Increased	47	1.24	0.75 to 2.07	61	1.16	0.75 to 1.79
Number of working hours						
Would like to work fewer	146	1		308	1	
Content with the number	546	1.64	1.30 to 2.07	457	0.84	0.69 to 1.02
Would like to work more	54	1.61	1.08 to 2.42	78	1.18	0.84 to 1.67
In the mood for work						
Often feeling uneasy on the way to work	26	1		114	1	
Sometimes feeling uneasy	78	0.55	0.32 to 0.92	244	0.67	0.48 to 0.92
Seldom feeling uneasy	642	0.92	0.56 to 1.50	492	0.56	0.41 to 0.78
Mastery						
Low perception	109	1		211	1	
Moderate perception	439	0.85	0.64 to 1.13	476	1.11	0.88 to 1.40
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Low decision latitude	199	1		332	1	
Moderate decision latitude	300	1.00	0.79 to 1.26	319	0.86	0.70 to 1.05
High decision latitude	237	0.87	0.67 to 1.12	188	0.80	0.63 to 1.03
Performance appreciated by superior						
To a rather small extent	140	1		273	1	
To some extent	304	1.31	1.02 to 1.68	333	1.02	0.82 to 1.26
To a great extent	291	1.41	1.08 to 1.84	221	1.05	0.82 to 1.35

The adds ratios are adjusted for all determinants in the models.

work, a trend in this study was that excellent work ability tended to be more dependent on physical factors, clear work tasks, and positive feedback, while prevention of poor work ability seemed more dependent on recuperation, mastery, and some psychosocial factors. Most of the identified determinants are amenable to influence, either within the personal sphere or at the organisational or societal level, opening up the possibility of interventions. The different patterns of determinants that were revealed will enable different approaches to enhancing work ability and reduce sick leave.

Although the aim of this study was not to establish the strength of each association, it is noticeable that the most pronounced predictor promoting excellent as well as preventing poor work ability was the level of sick leave the year before the baseline. This result corroborates the long since known predictive power of prior sick leave for future sick leave.[33] It also emphasises that preventive measures to lower the risk of sick leave are important to future work ability in the work force. By controlling for earlier sick leave we wanted to ensure that extra vulnerability caused by any earlier disease or dysfunction did not affect associations between the baseline characteristics and the outcome. However, earlier sick leave is not necessarily a confounder—it could well be caused by the same determinants as the recent sick leave and adjusting for it will then cause a slight underestimation of the associations.

The part of the work force that is 55 years or older shows an interesting duality. According to our results, on the one hand they have a higher probability of having excellent work ability and on the other hand they have a higher probability of poor work ability, which demonstrate both a healthy worker effect and a vulnerability among aging workers. This heterogeneity includes perhaps a wider range of individual capacities than other age groups, which can be of importance to consider in working life.

In many Swedish companies the employees are encouraged to join what the management regards as health promotive activities like physical workout, smoking cessation, and weight reduction. By sponsoring participation there is an expectation of lowered numbers on sick leave and thereby reduced costs. Our study gives support for the assumptions that this could be one track to support sustainable work ability but the expectations should be within reason. We have found that some lifestyle dependent factors probably act as determinants for work ability defined by sick leave, but we are not able to state if health promotion interventions at the workplace will contribute in this direction.

In line with other studies[5 8 25] we found that recuperation was a determinant for sustainable work ability. To attend work recuperated is more a mediating factor than a determinant by itself, as recuperation can be dependent on, for example, lifestyle, possibilities to recreate, and workload. Analysing these pathways is, however, not within the scope of this study.

Physical factors at work are often attributed to cause musculoskeletal disorders. Such disorders are one of the main reasons for sick leave in Sweden, often ending in prolonged spells.[34] Rather surprisingly we found no associations between physical exposure and poor work ability. In the separate analyses of each exposure variable, adjusted for sex, age, and earlier sick leave, there were statistically significant associations between physical factors at work and poor work ability (not shown). However, these associations were deleted in the multivariate models indicating that organisational and psychosocial factors are of greater significance to prevent poor work ability. On the contrary, we did find associations between non-strenuous physical work as well as seldom working with bent work posture and excellent work ability. Although weaker than expected, this was similar to findings in a study by Voss *et al*.[15]

Two of the tested psychosocial factors require comments, namely clarity of role at work and mastery at work. We found that high role clarity promoted excellent work ability but had no influence on poor work ability among employees in the public sector. These results are only slightly contrary to those in a study from the private sector by Väänänen *et al*.[35] They found that in white-collar men low role clarity was associated with a greater rate of long absences (≥21 days) than high role clarity. However, role clarity was not found to predict absence in other groups of employees, which is in line with our study. A possible explanation for the discrepancy in results could be divergent work situation in the public and private sectors or that we did not explicitly analyse white-collar men.

The association between perceiving high mastery at work and a higher probability of poor work ability may seem contradictory. We interpret this result as revealing that limited professional challenges lead to a perception of high mastery. A close look at the proportions of those perceiving high mastery in the participating professions supports this interpretation. We found that among personal assistants, cleaners, childcare workers, and constructions workers, 25–32% reported high perception of mastery whereas among teachers, psychologist, and physiotherapists only 13–14% did (not shown).

Methodological considerations

Many factors influence health and sick leave.[36] For this reason we wanted to include exposure variables covering different life domains. However, because of a lack of positively oriented health assessments our study contained only items constructed for traditional risk assessments. As the research in this area is so scanty, it is very possible that there are factors in the separate domains that are influential for promoting work ability that we are not aware of and thus do not have the tools to scrutinise. This possible shortcoming of our study suggests the need for more research.

A difficulty we encountered was in deciding the cut off points for the variables. There is no knowledge about the level at which an exposure acts as a promotive agent. By trichotomising the variables at what we judge to be reasonable levels and by relying on experiences from an earlier study,[37] we have tried to explore this uncharted area. The patterns of associations may have been different with different cut off points. Further research could perhaps reveal a minimum level of exposure needed for a variable to act in a health supportive way.

The response rate of 73% is satisfactory in order to draw conclusions from this study; however, the associations can have been somewhat attenuated as the dropouts reported worse health and more sick leave at the baseline.

This study was performed on employees in local authorities and county councils who work mainly in human relation professions, a constraint which limits the degree to which the study can be generalised. It is possible that the patterns of determinants will be different in other settings, not least of all because there may be other ways of setting up and organising exposures.

CONCLUSIONS

This explorative study showed different patterns of determinants promoting excellent work ability and preventing poor work ability among employees in the public sector. Most of the identified determinants are amenable to influence, either within the personal sphere or at the organisational or societal level, opening up the possibility of interventions. The different patterns of determinants that were revealed will

Main messages

- Partly different patterns of determinants seem to promote excellent work ability and prevent poor work ability.
- Promoting excellent work ability tended to be more dependent on physical factors, clear work tasks, and positive feed back.
- Preventing poor work ability tended to be more dependent on recuperation, organisational, and psychosocial factors.
- Lowering the present risk of sick leave is important for future work ability in the work force.

Policy implications

- As identified determinants are amenable to influence, this opens the way for interventions.
- Somewhat different approaches may be needed to address excellent and poor work ability.
- Supporting health promotive work factors does not reduce the importance of traditional risk elimination.

enable different approaches to enhancing work ability and reduce sick leave. Further studies are needed to establish if the health supportive approach is a practicable for a sustainable working life.

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